TRB COOPERATIVE RESEARCH PROGRAMS

Preparing Your CRP Final Report

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TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

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SECTION 1

GENERAL REQUIREMENTS

Research results are of little value if they are not disseminated; therefore, each of the Cooperative Research Programs of the Transportation Research Board makes every reasonable attempt to publish and to distribute widely the reports submitted on each project. Because the published reports become part of an ongoing series, consistency in their style of presentation is desirable. This guide provides information to research agencies so that the reports conform to the desired format.

The acceptability of final reports depends on three criteria: (1) fulfillment of project objectives as set forth in the contract, (2) adequacy of documentation, and (3) clarity of presentation. Reports should be complete in all their parts, organized appropriately to serve their purposes, accurate in matters of fact and documentation, and edited for basic uniformities of style and usage. Furthermore, all text and artwork should be suitable for publication with minimal editing so as to reduce the need for extensive modifications that will delay publication and may result in unintended changes of meaning.

SECTION 2

REPORT ORGANIZATION

CRP reports typically follow a standard format of front matter, body, and appendixes. The content of each is described below in the order of presentation.

FRONT MATTER

When a preliminary draft final report or a contractor's final report is submitted to CRP for review and possible publication, the draft report should contain all the following items as front matter.

Cover

The front external cover of reports submitted to CRP must be of light-colored, nonglossy material, preferably paper or heavy cardstock, and capable of accepting rubber-stamp ink without smearing. All reports must be numbered. For <u>sample covers</u>, <u>click here</u>.

Acknowledgment of Sponsorship and Disclaimer

All interim and final reports must contain <u>two statements printed exactly as indicated here</u>, either on the inside front cover or as the first sheet following the cover, preceding everything else and exclusive of any other information.

Title Page

A title page listing the same information as the external cover should follow the acknowledgment and disclaimer statements. This title page should include the authors' names, their affiliations, and the cities and states of their affiliations.

Note: CRP editors use the title page information to determine the listing of the authors in the published report; authors will be grouped by company affiliation. For <u>sample covers</u>, <u>click here</u>.

Table of Contents

A sample table of contents is shown <u>here</u>. Chapter and appendix titles, and at least the principal section headings within chapters, are included.

List of Figures and Tables

An acceptable list of figures and tables is shown <u>here</u>. All figures and tables must be included. Requirements for artwork (e.g., figures, tables, equations, and exhibits) are discussed in Section 3, Style.

Author Acknowledgments

The author acknowledgments section in the report should include the titles and affiliations (at the time the research was completed) of the research team members and other contributors, and their

connection with the research. If changes in title or affiliation have occurred, the titles or affiliations at the time of report submission also should be stated. Author acknowledgments do not cite CRP staff assistance or, usually, the assistance of typists or proofreaders. A typical acknowledgment statement follows:

The research reported herein was performed under NCHRP Project 12–58 by the Department of Civil, Structural, and Environmental Engineering at the University at Buffalo (UB), State University of New York (SUNY). UB was the contractor for this study, with the Research Foundation of SUNY serving as Fiscal Administrator.

Dr. Stuart S. Chen, P.E., Associate Professor of Civil Engineering at UB, was the Project Director and co-Principal Investigator. The other authors of this report are Dr. Amjad J. Aref, Associate Professor of Civil Engineering at UB and co-Principal Investigator; Il—Sang Ahn, Research Assistant and Ph.D. Candidate at UB, Methee Chiewanichakorn, Research Assistant and Ph.D. Candidate at UB, Aaron Nottis, Jeffrey Carpenter, and Ioannis Kalpakidis, Research Assistants and M.S. Candidates at UB. The work was done under the general supervision of Professors Chen and Aref at UB.

Abstract

An abstract of no more than 200 words, suitable for use in computerized information storage and retrieval systems, should be presented after the acknowledgments. The abstract will be provided to the Transportation Research Information Services (TRIS) and the National Technical Information Service (NTIS). The abstract should use direct statements in complete sentences to describe the work scope and principal findings. An example follows:

This report documents and presents the results of a study of the safety aspect of curb use. Full-scale tests in combination with computer simulations were applied to investigate vehicle behavior upon impact with a series of commonly used curbs. Three curb designs taken from the AASHTO geometric design manual and a special configuration 13 inches high were given consideration in the study. The four curbs were investigated at three vehicle approach angles and at three speed levels. Such vehicle responses as redirection, trajectory, path, roll and pitch, and acceleration were observed and evaluated. The model results correlated well with the full-scale results. The findings of the study suggest that curbs of the configurations tested have no redirection capabilities to enhance safety in a high-speed travel environment.

BODY OF THE REPORT

The body of a typical CRP report is designed to provide information to the transportation administrator, the operations-oriented transportation professional, or any other reader whose primary concern is to put research results into practice. (Sometimes, appendix material, such as a user's guide, is ultimately intended as the primary publication—in such instances, consult with the Program Officer regarding content organization.) For CRP reports, organization is very important. CRP asks authors to follow our standard structure as follows:

- Executive Summary
- Chapter 1 Background
- Chapter 2 Research Approach
- Chapter 3 Findings and Applications
- Chapter 4 Conclusions, Recommendations, and Suggested Research

- References
- Appendixes

Executive Summary

The Executive Summary often is the most influential part of the report and should be written with the busy transportation administrator in mind. The Executive Summary should provide a readable yet condensed description, explained within the context of the project scope and objectives, of the research findings, recommendations, products, and conclusions. The summary should contain only information essential to gain an understanding of the findings and how they relate to the solution of operating problems—it is NOT an abbreviated version of the full report.

Chapter Sequence and Descriptions

Report chapters should be structured in a concise and logical manner that is suitable to the subject matter, clearly describing the research approach, findings, conclusions, and recommendations.

The recommended sequence of chapters is outlined below, with a description of the typical content for each chapter. However, the structure of some reports may not conform to this sequence; in such cases, the research agency is encouraged to confer with the responsible CRP Program Officer.

Chapter 1: Background

Discussions of the problem that led to the study, current knowledge that can help in solving the problem, and the objectives and scope of the completed research are presented in this section. This chapter should not contain the details of any survey that may have been performed, any forms that may have been used in soliciting information, or details regarding test procedures or mathematical analyses that may have been used. All such details are to be provided in appendixes.

Chapter 2: Research Approach

This chapter presents the approach used in addressing the problem.

Chapter 3: Findings and Applications

The material in this chapter expands on the Executive Summary. A "finding" is the result of an examination. This chapter should include, as appropriate, summary data; principal mathematical formulas developed; what the findings mean, in terms of use in standards, specifications, policies, and procedures; what the findings add to an understanding of the problem and what effects they have on economy, safety, amenities, and convenience; an assessment of their limitations, and other information. However, details should be presented in the appendixes. Design charts, spreadsheets, software, and other items of immediate use to practicing engineers or other users may be presented here or presented in the appendixes.

Chapter 4: Conclusions and Recommendations

The conclusions should emphasize the most important findings and may extend the findings beyond conditions specific to the project. Successful applied research will result in specific

recommendations that should facilitate application of the findings and should be accompanied by information on potential benefits that can be expected from using the research products. A plan for implementing the research products should be part of the recommendations. If the project findings have revealed specific areas where further research would be valuable, these areas should be described in this chapter.

Chapter Sections

Within the chapter structure, subheadings should be used to separate subject matter. Properly used headings help readers, especially readers with limited time. As illustrated <u>here</u>, four levels are usually sufficient for CRP reports. Follow these styles.

REFERENCES

The last item in the body of the report is a list of the references cited in the text. Reference style is discussed in detail in Section 3.

APPENDIXES

Generally, appendix materials are provided for researchers, developers of manuals and guidelines, and other users of the research results who are interested in the maximum degree of technical detail provided by the project effort. They are usually not published by TRB with the report, but are made available electronically.

In some cases, appendixes may not be necessary or may be minimal in number and content; in others, appendixes may be larger than the body of the report. Each appendix must be designated by letter and title, and references to appendixes should be made, as necessary, at appropriate places in the text.

Appendixes may include the following items:

- 1. Manuals, guidelines, and proposed specifications;
- 2. Documentation and further elaboration of research findings:
- 3. Forms, checklists, and worksheets;
- 4. Mathematical analyses;
- 5. Bibliography (however, these may also be handled as a separate section in the same way that references are handled); and
- 6. Project statement and project work plan (including any approved revisions).

The <u>table of contents shown here</u> is an example of the appendix material provided with one final report. Ordinarily, bulky background data (such as computer-related files) are not provided, but are retained by the research agency (see CRP contract article relating to Data Retention and Disposition).

SECTION 3

STYLE

To achieve consistency in series publications, CRP editors use standard reference works for guidance. The latest edition of *Merriam-Webster's Collegiate Dictionary* is the preferred authority for spelling and capitalization. The *Chicago Manual of Style* and *Words Into Type* are also generally followed. Rules of style designed to ensure reasonable consistency in CRP reports follow.

TEXT

In preparing text for reports, adhere to the following:

- 1. Keep the formatting SIMPLE. Do NOT use quote boxes, icons, elaborate headers and footers, color, shading, pull quotes, and so forth. CRP contracts out to typesetters who format reports per specifications appropriate for technical publications. Generally, unusual or non-standard formatting wastes everyone's time and effort. If a more elaborate report format is needed, please discuss it with the responsible CRP program officer early.
- 2. Provide all material in hard copy format (including quotes, references, and so forth) on 8½-x 11-in. paper.
- 3. Provide all text material electronically in MS-WORD-compatible format.
- 4. Provide artwork electronically in a separate file or files (e.g., EPS, TIFF, or JPG).
- 5. Do not submit PDF files.
- 6. Make sure that electronic files and hard copy match exactly.
- 7. Begin each chapter or appendix on a new page.
- 8. Paginate the front matter with lowercase Roman numerals at the bottom of the page.
- 9. Paginate the body of the report consecutively with Arabic numerals at the bottom of the page.
- 10. Paginate appendixes with letters and Arabic numerals at the bottom of the page (i.e., A-1, A-2, ..., B-1, B-2, and so forth).
- 11. Make sure that all symbols, Greek letters, and mathematical signs are exact, defined, and absolutely unambiguous; for example:
 - w versus ω [omega]
 - p versus ρ [rho]
 - Y versus Ψ [psi]
- capital O versus θ [theta] versus 0 [zero]
- capital X versus χ [chi] versus \times [multiplication sign]
- lowercase 1 [el] versus number 1 [one]
- 12. Show the relative positions in equations and formulas of all subscripts, superscripts, fractions, and operators.
- 13. Give units of measure common to the field of research reported. Specific requirements for the units to be used in a project are dictated by the need to facilitate application of the findings in a particular technical area.
- 14. Provide appendix material as separate electronic files.
- 15. For large documents (that is, more than 75 pages), separate chapters into separate electronic files.

- 16. Call out the artwork in the text (for example, "See Figure 1") to indicate the position of the artwork.
- 17. Check every reference call-out in the text to ensure that the publication year and the spelling of the author's name match those of the reference list in the end. This step will save authors' time later because editors frequently find inconsistencies that require the author to verify references under tight production deadlines.
- 18. CRP permits the use of author-year referencing as well as sequentially numbered referencing. Use one or the other format in the text, not both. If using numbered references, put the number of the reference in parentheses following the cited text and italicize the number (but not the parentheses). If using author-year referencing, adhere to the examples below:

Single author: (Jones, 2005)

Two authors: (Jones and Smith, 2005)
Three or more authors (Jones et al., 2005)

Author-year reference lists should be provided alphabetically and, within a category, chronologically, e.g.,

Jones, R., 2001

Jones, R., 2003

Jones, R., and Smith, T., 2002

Projects may require that reports use (1) U.S. units solely; (2) customary U.S. units as the primary system, followed by SI units in parentheses; (3) SI units of measurement exclusively; or (4) SI units as the primary units of measurement, followed by customary U.S. units of measurement in parentheses. Additionally, issues related to hard or soft conversions of measurements may arise. The research agency should discuss the use of measurements with the CRP Program Officer early in the project.

General guidance on the appropriate use of metric units is available through the AASHTO *Guide* to Metric Conversion, AASHTO R1 (AASHTO's formal policy on metric), or through ASTM E380 (Standard Practice for Use of the International System of Units (SI)).

ARTWORK

Artwork consists of (1) tables (that is, systematic arrangements of data, in rows and columns for ready reference) and (2) figures (that is, diagrams or pictorial illustrations of textual matter). Artwork should be self-explanatory and should supplement, not duplicate, information given in the text. Adhere to the following instructions:

- 1. Provide artwork on pages separate from text material.
- 2. Number all tables in the body of the report consecutively with Arabic numerals.
- 3. Number all figures in the body of the report consecutively with Arabic numerals.
- 4. Order the pages in appendixes by appropriate letter and consecutive Arabic numerals (e.g., A-1, A-2, ..., B-1, B-2, ..., and so forth).
- 5. Title all tables to identify their contents. Cite the source of the material.

- 6. Caption all figures to identify their contents. Cite the source of the material.
- 7. Identify each piece of artwork (i.e., figures and tables) by author's name and the project number in addition to figure or table number.
- 8. Arrange tabular matter so that the intended comparisons are clear. Choose appropriate vertical columns to provide reasonable balance to horizontal and vertical dimensions.
- 9. When a dash (—) is used in a table, **indicate its meaning** in a footnote (e.g., missing data, data not available or applicable).
- 10. Combine tables of similar form in order to reduce space requirements, eliminate heading duplications, and permit easier comparison of values.
- 11. Use superscript **letters** for footnoting numerical values in tables, but superscript **numerals** for footnoting other material in tables.
- 12. Check the accuracy of all totals.
- 13. Cite each figure and table by number at the appropriate places in the text.
- 14. Design figures and tables to meet CRP publication requirements. In the published report, artwork will be reduced to 1-column width (3 ½ in.) or full-page width (7 ¾ in.). Lettering and numerals must be of adequate size and clarity on original drawings to permit this reduction.
- 15. Use figures of comparable size and scale when they are intended to be compared.
- 16. Use abbreviations, numerals, and capitals consistent with text material (see recommended style manual).

17. Submit one copy of each of the following for publication purposes

- a. Photographs—glossy prints, high-resolution digital files, or color slides.
- b. Line drawings—original black-on-white tracings, sharp photographic copies, or original laser print copies. (Photocopies and blueprints are seldom reproducible. Do not use fine-grid graphs unless the grid is quite open. Avoid screen tints.)
- 18. Check the spelling of all text in figures and tables.
- 19. Develop figures and tables so that their meaning does not depend on use of color (e.g., in bar charts)—CRP reports are rarely printed in color and color figures reproduced in black and white can lose meaning.

All artwork must be capable of being reproduced directly from **original** material submitted by the author; therefore, photocopies are not acceptable because they do not reproduce clearly. Research agencies should provide the highest possible resolution of art. Because art typically looks better on a computer screen than in print, something may look to be of acceptable quality on a screen, but be unacceptable for print. Photos should be at least 300 dpi, and scanned line drawings or exhibits should be at least 1,200 dpi. Make sure that art does not depend on color to convey meaning—CRP generally prints in black and white.

For further information, consult CRP Editorial Staff.

REFERENCES

Reference sections, unlike bibliographies, list only sources cited in the text and in the order of citation. (Bibliographies generally include all sources consulted, not just those cited in the text, and generally are organized alphabetically.) CRP prefers reference sections to bibliographies.

The listing of references demands absolute accuracy. Definite rules for the identification of reference materials have been adopted. These rules should be carefully observed. At a minimum, authors should supply enough information so that readers can verify the reference.

1. List numerous references together at the end of the text in the **order in which they are cited in the text**. An item in this list is referenced in the text by an italic Arabic numeral in parentheses at the pertinent point.

Example: Beskow (14) says...

- 2. Be sure that (a) names are spelled correctly and consistently.
 - (b) initials and dates are correctly given.
 - (c) the title of the article is given as published.
 - (d) ACS (American Chemical Society) abbreviations are used for periodicals and other standard publications.
- 3. Avoid unpublished references. Do not use expressions such as "Paper prepared for presentation...," or "Paper presented at..." when publication has occurred.
- 4. Print the names of journals, proceedings, bulletins, and so forth in italics; print the titles of papers in Roman, thus: Jones, J. J., A Technical Paper. *Proceedings*, American Society for Testing Materials, Vol. 22, Part II (1922) p. 450.
- 5. In citing (and in listing), if reference is made to the whole work, give the total number of pages; if only to a specific part, give the pages involved. If several separate pages or parts of the same work are referred to at different places in the text, give the entire work in the reference list; in the text, simply use (3, pp. 16-21), (3, p. 24), (3, Ch. 5). A reference in the list should not be repeated or be referred to by the use of ibid., loc. cit., and so forth.
- 6. Make sure that entries agree with text and other citations of references. **Text revisions may** require renumbering or other reference changes and vice versa.
- 7. Use the following samples as guidance on treating reference items:

Periodical: Smith, John M., "Unanticipated Uses of Asphalt by Juveniles." *Highway*

Periodical, Vol. 1, No. 2 (January 10, 2009) p. 36.

Proceedings: Smith, J. M., and A.B. Jones, "Punishment and Reducing Vandalism" 5th

Int. Conf. on Enhancing Transit, Jacksonville, Florida, Proceedings Vol. 5

(2009) pp. 1-8.

Report/Book: Smith, K. T., and T. D. Jones, *Challenges to Marketing Transit in the*

Death Valley, Brown Publishing, Inc., Bristol, England (2009) 7,500 pp.

Websites: http://trb.org. (As of February 10, 2006).

For further information, consult CRP Editorial Staff.

BIBLIOGRAPHY

Bibliographies, unlike reference sections, list sources consulted, but not necessarily cited in the text. Bibliographies generally are organized alphabetically. (Reference sections list only the sources cited in the text and in the order of citation.) Although CRP prefers reference sections, if a bibliography is included, arrange the entries as one of the following:

- 1. **Alphabetical Arrangement by Author.** Arrangement by author will include names of persons (i.e., authors, editors, and compilers) and corporate bodies (e.g., governmental agencies, societies, institutions, and so forth). In listing federal governmental agencies, "U.S." should precede the name of the agency so that such entities may be grouped in the bibliography.
- 2. **Chronological Arrangement.** A bibliography may be arranged chronologically to show the development of a subject. Entries are then arranged alphabetically by author under the year.
- 3. **Classified Subject Arrangement.** This arrangement is made on the basis of a systematic division of the subject of the bibliography. Alphabetical author arrangements are used in such lists under each subject.

Each entry in a bibliography provides information that should result in ready identification. Entries must be sufficiently detailed, intelligible, and consistent in form with the style followed throughout the bibliography.

An annotation, in the form of a paragraph, may be placed after the main body of the entry. Compress the annotation to the fewest possible words.

For further information, consult CRP Editorial Staff.

ABBREVIATIONS, ACRONYMS, INITIALISMS, AND SYMBOLS

Abbreviations, acronyms, initialisms, and symbols should be fully defined the first time they are used in the report; the definition should be given first followed by the abbreviated term in parentheses. Including a list of the abbreviations, acronyms, initialisms, and symbols used in the text is desirable. However, including such a list does not absolve report authors from defining terms in the text itself—this is particularly true for equations and formulas.

For further information, consult CRP Editorial Staff.

FOOTNOTES

Do not use footnotes to the text. Incorporate such notes within the text. Footnotes are acceptable only for artwork. If material does not make sense in the body of the text, it probably is not necessary to the report.

USE OF COPYRIGHTED MATERIAL

Authors are responsible for obtaining any necessary permissions for use of copyrighted material. Authors must obtain permission from the original publisher to reprint any table, photo, or other artwork or to excerpt large portions of text. If there is any doubt about whether reprinted material is copyrighted, the principal investigator should check with the original author and/or publisher. Permission in writing to use copyrighted material must then be obtained by the research agency—not by CRP editorial staff—from both the author and the publisher. Copies of all correspondence regarding permission to use copyrighted material, particularly the final letters granting permission, should be transmitted to CRP, where they will become part of the permanent file on the particular report.

Practically all commercial journals are copyrighted in toto, as are most association journals, all commercial books, many association books and manuals, many special reports (e.g., ASTM, TRB, and so forth), and all newspapers. Any use of foreign materials should be checked as carefully as materials published in the United States.

After permission to use copyrighted material has been obtained, provide both a bibliographical reference to the source and a specific tie to the referenced material, particularly exhibits. For text material, the edition and page (preferably located by lines) should be cited; for tabular material, the page and table number should be given.

Project No	COPY NO	Project No	COPY NO
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[INSERT TITLE]

PRELIMINARY DRAFT FINAL REPORT

Prepared for
[Insert the appropriate program name, e.g., ACRP]
Transportation Research Board
of
The National Academies

TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES PRIVILEGED DOCUMENT

This report, not released for publication, is furnished only for review to members of or participants in the work of the CRP. This report is to be regarded as fully privileged, and dissemination of the information included herein must be approved by the CRP.

[Insert Author Name(s), Relevant Research Organization Name City, State Month, Year]

Figure 1. Example of preliminary draft final report cover for CRP report.

[INSERT TITLE]

FINAL REPORT

Prepared for
[Insert the appropriate program name, e.g., ACRP]
Transportation Research Board
of
The National Academies

[Insert Author Name(s), Relevant Research Organization Name City, State Month, Year]

2. Example of revised final report cover for CRP.

ACKNOWLEDGMENT OF SPONSORSHIP

This work was sponsored by one or more of the following as noted:

- C American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the **National Cooperative Highway Research Program**,
- C Federal Transit Administration and was conducted in the **Transit Cooperative Research Program**,
- C American Association of State Highway and Transportation Officials, in cooperation with the Federal Motor Carriers Safety Administration, and was conducted in the **Commercial Truck and Bus Safety Synthesis Program**,
- C Federal Aviation Administration and was conducted in the **Airports Cooperative Research Program**,

which is administered by the Transportation Research Board of the National Academies.

DISCLAIMER

This is an uncorrected draft as submitted by the research agency. The opinions and conclusions expressed or implied in the report are those of the research agency. They are not necessarily those of the Transportation Research Board, the National Academies, or the program sponsors.

Figure 3. Acknowledgment of sponsorship and disclaimer for CRP preliminary draft final reports and final reports.

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Figure 4. Sample of table of contents for revised final reports.

CHAPTER NUMBER

CHAPTER TITLE

FIRST-LEVEL HEADING (bold, caps, flush left)

The text begins here... and continues here...

Second-Level Heading (bold, initial caps/lowercase, flush left)

The text begins here... and continues here...

Third-Level Heading (italics, initial caps/lowercase, flush left)

The text begins here... and continues here...

Fourth-Level Heading. (bold run-in) The text begins here... and continues here...

Figure 5. Employment of headings within chapters.